



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/575,338

04/10/2006

Toshimichi Makii

2003JP323

1811

26289

7590

12/18/2009

AZ ELECTRONIC MATERIALS USA CORP.
ATTENTION: INDUSTRIAL PROPERTY DEPT.
70 MEISTER AVENUE
SOMERVILLE, NJ 08876

EXAMINER

EOFF, ANCA

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

12/18/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/575,338	Applicant(s) MAKII ET AL.	
	Examiner ANCA EOF	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 6, 21 and 22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 6, 21 and 22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 6, 21 and 22 are pending. Claims 1-5 and 7-20 have been cancelled.
2. The certified translation of the foreign priority document JP 2003-373069, filed on October 31, 2003 was received and acknowledged.

Continued Examination Under 37 CFR 1.114

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 23, 2009 has been entered.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 6 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sander et al. (US Patent 4,247,611) in view of Uetani et al. (US Patent 6,245,478) and in further view of Pai et al. (US Patent 5,648,194).

Art Unit: 1795

With regard to claim 6, Sander et al. disclose a radiation-sensitive composition comprising:

(a) a compound which forms an acid under the influence of actinic radiation, and
(b) an organic polymeric compound which contains recurring acetal or ketal groupings in its main chain and whose solubility in a liquid developer is increased by the action of an acid, wherein the developer may be a weak alkaline solution (column 1, lines 55-60 and column 2, lines 3-4).

Sander et al. further disclose that this composition acts as positive-working composition (column 8, lines 22-23).

Sander et al. further disclose that the polymeric compounds (b) containing recurring acetal groups are polycondensation products containing recurring units obtained by reacting aldehydes $R_1\text{-CHO}$ or acetals $R_1\text{CH(OR}_7)_2$ with diols $\text{HO-R}_3\text{-OH}$, wherein R_1 is an alkyl group with 1-12 carbon atoms, R_7 is an alkyl group with 1-6 carbon atoms (column 3, lines 10-33).

Sander et al. do not specifically teach the polymer with the acetal unit of formula (I) of the instant application.

However, it would have been obvious to one of ordinary skill in the art at time of the invention to obtain such a polymer, based on Sander's teaching that an aldehyde $R_1\text{-CHO}$ reacts with a diol $\text{HO-R}_3\text{-OH}$ to form a polymeric structure with acetal units.

A specific example of the aldehyde $R_1\text{-CHO}$ is n-butanal (column 3, line 54). This is equivalent to the aldehyde $R\text{-CHO}$ of the instant application, wherein R is a propyl group.

A specific example of the diol $\text{HO-R}_3\text{-OH}$ are polyethylene glycols with average molecular weights between 200 and 600 (column 4, lines 21-22). These compounds are equivalent to the compound of formula $\text{HO-(C}_2\text{H}_4\text{O)}_n\text{-H}$ of the instant application, wherein n may be an integer between 4 and 10 .

The polycondensation product of n -butanal and the above-mentioned polyethylene glycol will be equivalent to the unit of formula (I), wherein R is a propyl group and n is an integer from 4 to 10.

The examiner would like to point out that the specification of the instant application also teaches that a polymer comprising a unit of formula (I) may be obtained by reacting an aldehyde RCHO or an acetal RCH(OR')_2 with a polyethleneglycol of formula $\text{HO-(C}_2\text{H}_4\text{O)}_n\text{-H}$, wherein $n=1-10$ (page 9, lines 2-10).

Therefore, the compound (b) of Sander et al. is equivalent to the compound (B) of the instant application.

Sander et al. further disclose that the composition may comprise a binder such as a novolak resin (column 8, lines 28-38), equivalent to the alkali-soluble novolak resin (A) of the instant application.

Sander et al. further disclose that the composition may be comprise compounds such as sulfonium salts, iodonium salts, halogen containing compounds (column 9, lines 5-11), which are equivalent to the acid generating compound (C) of the instant application, as disclosed on page 11 of the specification.

Sander et al. disclose that derivatives of positive-working o-quinone diazides may be used (column 9, lines 25-26) but fail to specifically teach the compound comprising a quinonediazide group (D) of the instant application.

Uetani et al. teach a resist composition (abstract). Uetani et al. teach that a positive resist may comprise a quinone diazide compound, such as a 1,2-naphthoquinone diazide-5- or 1,2-naphthoquinonediazide-4-sulfonate of a polyhydroxy compound having at least three phenolic hydroxyl groups (column 6, lines 30-43). These compounds are obtained by reacting a compound with phenolic hydroxyl group with a halide o-quinonediazide sulfonate (column 8, lines 20-21).

As Uetani et al. show that 2-naphthoquinone diazide-5- or 1,2-naphthoquinonediazide-4-sulfonate of a polyhydroxy compound having at least three phenolic hydroxyl group are used in positive resists, it would have been obvious to one of ordinary skill in the art at the time of the invention to use them in the composition of Sanders et al., with a reasonable expectation of success.

The 1,2-naphthoquinone diazide-5- or 1,2-naphthoquinonediazide-4-sulfonate of a polyhydroxy compound having at least three phenolic hydroxyl groups obtained by reacting a compound with phenolic hydroxyl group with a halide o-quinonediazide sulfonate are equivalent to the compound (D) of the instant application.

Sander et al. further disclose that the radiation-sensitive compounds may be used as mixtures (column 9, line 5).

Therefore, it would have been obvious to use a mixture of radiation sensitive compounds such as quinone diazide compounds (D) and acid generators (C).

Sander et al. further disclose that other alkali-soluble resin, such as a copolymer of methyl methacrylate and methacrylic acid may be used (column 8, lines 52-54). This copolymer is equivalent to the alkali-soluble acrylic resin (E) of the instant application.

Sander et al. do not disclose that mixture of alkali-soluble resins may be used in the composition. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to use more than one alkali-soluble resin, for the same purpose.

"It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from their having been individually taught in the prior art." *In re Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980) (citations omitted) (MPEP 2144.06 Art Recognized Equivalence for the Same Purpose)

However, Sander et al. and Uetani et al. fail to disclose that the positive resist composition may comprise a compound (F) with at least two vinyloxyalkylester groups.

Pai et al. disclose a photoresist composition comprising an alkali soluble resin, an o-naphthoquinone diazide sulfonic acid ester photoactive compound and a vinyl ether compound. The naphthoquinone diazide sulfonic acid ester is replaced in part with the vinyl ether composition to decrease the concentration of photoactive compound while increasing the photospeed of the composition (abstract and column 3, lines 13-17).

The naphthoquinone diazide sulfonic acid ester of Pai et al. may be a condensation product of 1,2-naphthoquinonediazide-4-sulfonic acid halide or 1,2-naphthoquinonediazide-5-sulfonic acid halide with phenols (column 4, lines 6-37), which are equivalent to the 1,2-naphthoquinone diazide-5- or 1,2-naphthoquinonediazide-4-sulfonate of a polyhydroxy compound of Uetani et al.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a vinylether in the composition of Sander modified by Uetani, as taught by Pai et al., in order to decrease the amount of naphthoquinone-1,2-diazide sulfonic acid ester needed for the composition, while maintaining the image resolution and increasing the photospeed (Pai et al., column 3, lines 13-17).

Pai et al. further disclose that the vinylether compound may be bis (4-vinyloxybutyl)isophthalate, bis(4-vinyloxymethylcyclohexylmethyl)glutarate and bis (4-vinyloxybutyl)succinate (column 4, lines 63-65). These compounds are equivalent to the compound (F) with at least two vinyloxyalkylester groups of the instant application.

Sander et al. disclose that the alkali-soluble resin may be comprised in the composition in an amount of 30-90 % by weight based on the solid content (column 8, lines 54-57).

The alkali-soluble acrylic resin should be comprised in an amount up to 20 percent by weight of the alkali-soluble resin (column 8, lines 65-66). If the acrylic resin represents 20% by weight of the alkali-soluble resin and the novolak resin represents 80% by weight, the ratio novolak resin : acrylic resin is 100:20, which is within the range of novolak resin (A): acrylic resin (E) of the instant application.

Sander et al. further disclose that the radiation sensitive compounds may be used in an amount of 0.1-10 % by weight based on the total weight of the solids (column 10, lines 14-17). Therefore the ratio of novolak resin : naphthoquinone-1,2-diazide compound is 100: 0.033 to 11.11, which is in the range alkali soluble resin (A) : photosensitizing agent (D) of the instant application. Also, the ratio of novolak resin :

Art Unit: 1795

acid generator is 100: 0.033 to 11.11, which is in the range alkali soluble resin (A) : acid generator (C) of the instant application.

Sander et al. teach a composition wherein the polymer with acetal units is comprised in an amount of 29 parts per 100 parts of alkali-soluble novolak resin (see Example 1 in column 20, lines 15-31). This value is within the range of novolak resin (A): polymer with acetal groups (B) of the instant application.

Pai et al. teach a composition comprising a novolak resin and a vinyl ether in a ratio of 100:16.66 (see column 6, lines 45-53), which is within the range of the instant application of novolak resin (A): component (F).

With regard to claim 21, Sander et al. teach that a copolymer of methyl methacrylate and methacrylic acid may be used as alkali-soluble resin (column 8, lines 50-54). Such copolymer is equivalent to the alkali-soluble acrylic resin containing a structural unit of an alkylmethacrylate and a structural unit of methacrylic acid of the instant application.

6. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sander et al. (US Patent 4,247,611) in view of Uetani et al. (US Patent 6,245,478) and Pai et al. (US Patent 5,648,194) as applied to claim 6 and in further view of Hatanaka et al. (WO 03/087941, wherein the citations are from the English equivalent document US Pg-Pub 2005/0147914).

With regard to claim 22, Sander modified by Uetani and Pai teach the composition of claim 6 (see paragraph 5 above). Sander et al. further teach that a

Art Unit: 1795

copolymer of methyl methacrylate and methacrylic acid may be used as alkali-soluble resin (column 8, lines 50-54).

However, Sander, Uetani and Pai fail to teach a copolymer of a hydroxyalkylmethacrylate and an alkylmethacrylate.

Hatanaka et al. disclose a positive resist composition comprising an alkali-soluble resin (abstract), wherein the alkali-soluble resin may comprise a hydroxyethylmethacrylate unit and a methyl methacrylate unit (par.0059, par.0075).

A positive resist comprising such copolymer leads to a pattern with good properties (par.0077).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a copolymer comprising a hydroxyethylmethacrylate unit and a methyl methacrylate unit, as taught by Hatanaka et al., as alkali-soluble resin in the composition of Sander modified by Uetani and Pai, with a reasonable expectation of success.

A copolymer comprising a hydroxyethyl methacrylate unit and a methyl methacrylate unit is equivalent to the acrylic resin (E) of the instant application.

Response to Arguments

7. Applicant's arguments with respect to the amended claims 6, 21 and 22, see pages 5-6 of the Remarks filed on October 23, 2009 have been considered but are moot in view of the new grounds of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANCA EOFF whose telephone number is (571)272-9810. The examiner can normally be reached on Monday-Friday, 6:30 AM-4:00 PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia H. Kelly can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. E./
Examiner, Art Unit 1795

/Cynthia H Kelly/
Supervisory Patent Examiner, Art Unit 1795

Application/Control Number: 10/575,338
Art Unit: 1795

Page 11